Standard-based Systems Management Solution for KVM

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- Introduction to Systems Management
- Introduction to CIM and WBEM
- Existing WBEM Infrastructure
- CIM-Enablement for KVM
Systems Management (1/3)

- **Tasks**
  - Administration
    - List
    - Installation
    - Configuration
  - Operation
    - Monitoring
    - Problem Determination

- **Problems**
  - Heterogeneity in
    - Hardware
    - Operating Systems and Middleware
    - Applications
  - Volume of
    - Monitoring Data
Systems Management (2/3)

- Solutions
  - Problem Oriented Standards (SNMP)
    - Interoperable
    - Only partial solutions
    - Can be extended beyond original scope – but with loss of interoperability
  - Proprietary Systems Management Suites
    - End-To-End
    - Missing Interoperability
Systems Management (3/3)

- Interoperability has to deal with
  - Unclear Semantics on
    - various problem domains / perspectives
    - different technology / encoding / protocol
  - Interoperability needs
    - Common Standards for
      - Modeling
      - Protocol
      - Problem Domains
Distributed Management Task Force

- Industry Consortium to
  - Develop Management Standards
  - Promote Interoperability for Enterprise & Internet Environments
Common Information Model (1/3)

• Foundation of DMTF technologies with focus on
  - Concepts
  - Modeling

• Consists of
  - CIM Infrastructure
    • describes the object oriented modeling and composition features
  - CIM Schema
    • delivers semantically rich, object-oriented model descriptions for all managed elements
Common Information Model (2/3)

- CIM Infrastructure consists of
  - Meta Schema
    - Schema, Classes, Associations
    - Instances, Properties, Methods
    - Qualifiers (Meta-Attributes)
  - Modeling Features
    - Inheritance, Overriding of Properties and Methods
    - Association
    - Logical Grouping of Classes via Schema
  - Details for Integration with other Management Tools
    - Encoding to MOF, UML, XML
Common Information Model (3/3)

- CIM Schema consists of
  - Core Schema
    • contains the essential classes for Systems Management (Core)
  - Common Schema
    • contains the most important classes for various disciplines (System, Device, Network, User, Application, Database, ...)
  - Example
Distributed Management Task Force

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Web Based Enterprise Management

- WBEM as Standard for Interoperable Systems Management

- Defines Implementation rules for CIM-based Systems Management
  - XML Encoding of CIM Objects
  - Semantical Definition of CIM Operations for Schema and Object Manipulation
  - Protocol “CIM Operations over Http”
WBEM Architecture

- three-tiered
  - Management Apps aka CIM Client
  - CIM Object Manager aka CIM Server
  - Providers for Resource Access
Distributed Management Task Force

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Management Initiatives

“DMTF & Industry Management Initiatives”
(SMASH, DASH, SMI, CDM, ...)

WBEM Protocols
(CIM-XML, WS-Management, WSDM, CLP)

Profiles
(Systems, Devices, Software)

WBEM Infrastructure
(Operations, Events, Query Language, ...)

CIM Schema
(Models, Classes, Properties, Methods)

CIM Infrastructure
(Meta Schema, Rules, MOF, ...)
```
Profiles

- Profiles
  - define the CIM model and associated behavior to address specific management domains
  - provide a unified way of describing management domains in CIM
    - Interoperability
    - Ease of use

- System Virtualization Profile
WBEM Solutions

- Non Open Source
  - Microsoft's WMI
  - Sun's WBEM Services for Solaris
Open Source
WBEM Infrastructure (1/3)

• CIMOMs
  • Small Footprint CIM Broker (sfcb)
    - C
  • OpenPegasus (RHEL 4 ++)
    - C++
  • OpenWBEM (SLES 9 ++)
    - C++
  • WBEMServices
    - Java
Open Source
WBEM Infrastructure (2/3)

- CIM Clients ordered by programming language
  - C (sfcc)
  - C++ (OpenPegasus, OpenWBEM)
  - Java (WBEM Services)
  - Python (PyWBEM)

- WBEM Applications
  - WBEM SMT
Open Source WBEM Infrastructure (3/3)

• CIM Providers

• Novell Providers (SLES)
  – base
  – SMASH Profile

• SBLIM Providers (RHEL, SLES)
  – base, network, file system & volume, nfsv3/4, syslog, sysfs
  – Monitoring Infrastructure (gatherer, plugins for data gathering)

• their number is increasing constantly ...
CIM-Enablement for KVM (1/2)

- KVM benefits of CIM's / WBEM's
  - Industry Acceptance
  - Proven Infrastructure / Development Environments
    - CIM Clients
    - CIMOMs
    - Test Suites
  - Common Virtualization Model
    - Part of latest CIM Schema v2.16 (coming soon)

- KVM delivers a standardized, model-based, interoperable Systems Management Interface
CIM-Enablement for KVM (2/2)

- What needs to be done?
  - Implementation of the Virtualization Profile(s) for KVM (writing providers)
  - Adoption of KVM providers into RHEL and SLES
  - CIM Application Extensions to make use of the KVM providers
Provider Architecture

Diagram showing the architectural layers and components of a provider, including:

- **Management Application**
- **CIM API**
- **CIM Operations over Http**
- **CIM Object Manager**
- **Provider**
- **CIM Layer**
- **Resource Access Layer**
- **Resource**

Interconnections and relationships between these layers and components are depicted graphically.
KVM Provider Architecture

Management Application

CIM API

CIM Operations over Http

CIM Object Manager

Provider

CMPI

libvirt

QEMU / KVM
KVM Provider Dev Status (1/2)

- IBM Internal Prototype
- Implementation of
  - System Virtualization Profile
  - Virtual System Profile
  - tbc
- Providers to represent
  - VMs, Host System
  - Virtual Devices (Processor, Disk, Network Port)
  - Association between the VMs and Virtual Devices
  - Pools (Processor, Memory)
KVM Provider Dev Status (2/2)

- **Short term goal**
  - Implementation Guideline for KVM providers
    - Provider structure
    - Naming conventions
    - Common functionality

- **Long term goal**
  - Contribution to libvirt
  - while “long term” means as soon as possible ;)

Thanks

Q & A